Minutes of the 10th SALT Science Working Group meeting

26th October 2003

SAAO Boardroom
SAAO, Cape Town

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The tenth meeting of the SSWG took place on Sunday 26th October 2003, in the SALT Boardroom, Cape Town. Gerald Cecil kindly volunteered to take the minutes.

Presentations given at the meeting can be downloaded from the SSWG website (www.salt.ac.za/content/science/ restrict/restricted_pages.htm) using the username “sswg” and password “t1meM@ch1ne”.

1 Participants

Members:
Michael Albrow (Canterbury)
David Buckley (Project Scientist, Chair)
Gerald Cecil (North Carolina)
Patrick Côté (Rutgers)
Brian Chaboyer (Dartmouth College)
Richard Griffiths (CMU)
Wolfram Kollatchny (Göttingen)
Janucz Kaluzny (CAMK, Poland)
Ken Nordsieck (Wisconsin-Madison)
Darragh O’Donoghue (South Africa)
Larry Ramsey (HET)
Anne Sansom (UK SALT Consortium)

Ex-officio attendees:
Eric Burgh (Wisconsin)
Chris Clemens (North Carolina)
Peter Cottrell (Canterbury)
Roy Emmerich (SALT)
David Lambert (McDonald Observatory)
James O’Connor (SAAO)
Jeff Percival (Wisconsin)
Marek Sarna (CAMK, Poland)
Nicholas Sessions (SAAO)
Gerhard Swart (SALT)
Jian Swiegers (SALT)
Patricia Whitelock (SAAO, South Africa)
Ted Williams (Rutgers)
2 Agenda
1. Technical status of SALT (Gerhard Swart)
2. Performance of the primary mirror system (J. Swiegers)
3. Observing protocols and how partners will interact with SALT (David Buckley, Encarni Romero Colmenero, Roy Emmerich)
4. Commissioning and Verification phases: discussions
5. SALT bandwidth and data distribution discussions
6. SALT HRS Preliminary Design Review: report and response (David Buckley & Peter Cottrell)
7. Status of HRS and plans (Michael Albrow & Peter Cottrell)
8. Report on FIF PDR and status (David Buckley)
9. SALT Operations (Patricia Whitelock and James O’Connor)
10. PFIS update (Ken Nordsieck)
11. SALTICAM update (Darragh O’Donoghue)
12. SALT Partner reports

3 Minutes of previous meeting
The meetings of the previous SSWG meeting, held in Cape Town on April 28/29 2003, were presented. Larry Ramsey moved and Brian Chaboyer seconded that the minutes were accepted. The motion was carried unanimously.

4 SALT Technical Status (Gerhard Swart)
Gerhard gave an overall summary of the current status of the project, which can be downloaded from the SSWG webpages: www.salt.ac.za/content/science/restrict/restricted_pages.htm as a PowerPoint file “SE-technical-Oct03.ppt”.

4.1 Summary of Progress
The main objective for 2003 was the start of on-sky testing. This was achieved in Oct (3 weeks late). The next planned milestone is the start of guided observations, closing the guiding loop using SALTICAM (guider not yet installed). The latter task will be harder because the SAC is behind schedule, and the HET’s “surrogate” SAC (SSAC) is being used instead.

Both the Facility & Dome are completed, although acceptance testing still needs to be finished.

The Tracker was installed in September and is currently being commissioned. The SAC FAT is scheduled for Nov, but in the meantime we are using the surrogate SAC from HET. This delivers a smaller FoV and non-optimal image quality, but will still be able to be used for pointing/tracking tests.

A total of 18 primary mirror segments are now installed, and 80 blanks accepted from LZOS.

Recent Highlights:
• started on-sky testing
• good mirror alignment performance
• systems generally reliable
• tracker pointing and tracking looks good
• dome seeing looks good (opening louvers significantly improves seeing)
4.2 Status per subsystem

**Facility**
The Facility is essentially complete, but minor warranty issues are still being addressed. There are still a few leaks, but it hasn’t rained enough to find them all yet. Complete testing of the louvers needs to be carried out over a longer time.

Dome seeing is to be evaluated at a system level once all heat sources are in the building. The dome drive friction has been increased to prevent slippage. A prime focus access platform is now attached to the dome (200 kg limit), for personnel access.

**Structure**
The Telescope Structure is working well. There were initial concerns regarding the air supply (the air bearings would lift, then run out of air). Airflow was adjusted to balance pressures, and now all is working fine. There is smooth acceleration, and no perceptible motion. We recently added a pier cover to protect concrete bearing surface, which is ~100 mm offset, and also provides a ventilation jacket connecting to false floor. There are minor issues to fix. Now we just need to inspect air bearing locations on the pier, since the rest is protected.

**Telescope Control System**
TCS build 1 is just for basic functionality, build 1.3 is for building management system, structure & dome. A pointing model has been partially tested as part of engineering first light effort (i.e. first on-sky tests).

Build 1.4 to be re-scheduled once the primary mirror alignment process has matured more. Build 1.5 (tracker), 1.6 (payload) & 1.7 (pointing) are all in progress. Build 2 includes observing support.

Integration of the TCS has been done: structure, dome, facility control, weather display & logging for last 6 months.

Andre Erasmus is writing weather prediction software, Ken indicated he would like to see weather stats.

**Tracker**
The on-site ATP is not done yet. This will be achieved in 2 steps:
1. sub-array tests (measure distance & angle between M1 and tracker)
2. full-array tests (on-sky test, will take place early next year)

**Payload**
The non-rotating structure was installed on the tracker, while the rotating part is here at SAAO. The mirrors, etc, have been integrated and the guide probes have been tested at the supplier. The SAC part of the payload is late, with an APT anticipated for Nov & delivery ~2 weeks thereafter. The ADC and moving baffle control have been tested, as have the guide & focus camera controls.

The non-rotating structure is well over the specified mass (60 kg specified, 120 delivered). SSWG expressed some concerns about being over mass-budget because this counts against the 1000 kg payload mass.

The rotating structure has been delivered, with the mass in spec. SALTICAM VI installation has been done and it works.
4.3 Engineering 1st light

The first on-sky testing with SALT has commenced, using the SSAC (a 2-mirror system) borrowed from the HET. The observation of a pre-defined object, the globular cluster 47 Tuc, marks the start of this on-sky testing phase.

The major objectives during this phase are:
- stimulate maturity of subsystems by having a single, unified, objective
- find possible problems early
- understand more about the system, optics, pointing, seeing, stability
- support overall project schedule

These tests have involved using an initial configuration of 18 mirror segments, aligned optically to ~0.3” (sometimes a lot better), which lasts for much of the night. The main changes are that the effective global radius of curvature changes. The tracker with the laser autocollimator & Mach-Zender distance measuring interferometer are both operational.

A TCS simulator provides a pre-determined trajectory derived from RA, DEC, Epoch using the SALT pointing model. The SALT building is conditioned to minimize dome seeing, i.e. by implementing daytime air conditioning and night time natural ventilation. SALTICAM has been installed in the straight-through PFIS position in VI mode (no optics), and with the SSAC and its transfer lens, delivers a ~90” diameter FoV. In addition, a 100 mm f/10 "spotter scope" with a 45’ diameter FoV, is mounted on the payload to assist in determining where SALT is pointing. One of the SALT CCD guidance cameras is connected to the spotter scope.

Encouraging results have been obtained:
- mirrors stayed aligned
- tracker followed trajectory
- TCS simulator successfully created and sent correct trajectories
- structure and dome worked well
- dome seeing was imperceptible

The SSWG were complimentary of the results to date, and a vote of thanks to everyone involved reaching this important milestone was passed (Proposed: David; Seconded: Larry; unanimous).

5 Performance of M1 (Jian Swiegers)

Jian gave a status summary of the Primary Mirror subsystem, which can be downloaded from the SSWG webpages: www.salt.ac.za/content/science/restrict/restricted_pages.htm as a PowerPoint file “PM-Oct03.ppt”.

Mirrors
80 blanks have been ATP’ed (the last batch 3 weeks ago), 64 of them are at Kodak, being polished and figured. CELT is now very interested in the Astrosital material. 19 mirrors are figured and 18 installed in the telescope, 91 segments should be ATP’d by 28 Feb 04 (i.e. fully populating the telescope), 94 will be received by 15 Apr 05 (i.e. spares). The mirrors are processed in batches of 8 at a time.
**Mirror Mounts**
18 mirror mounts are installed (with their mirrors) and 2 are currently at Kodak. There have been some flexure failures, and these are being replaced. The reasons for these failures are pretty well understood, mostly involving handling of the units, and will be avoided in future. Segment installation time is down to ~1.5 hr.

**Coating Plant**
The mirror coating plant is now fully functional, with 25 coatings done to date. A third version of the segment carrier bracket is still to be tested. Coating of the mirrors has many complications. The vapor degreasing and washing area are too cramped and needs to be enlarged.

**Edge Sensors**
SAMS (= the edge sensing system) has been implemented on a 7 segment sub-array. The edge sensors have been fitted but not fully calibrated yet. The results to date are very promising, but still requires extensive testing, particularly characterizing the environmental effects, like how the Relative Humidity and temperature affect the results. The 2nd batch of sensors will be installed next week.

**Mirror Alignment**
MACS (= Mirror Alignment Control System), which is the software used to control the primary mirrors, is in use for all testing, and is functional. A TCS interface is being built for it. CCAS (= Centre of Curvature Alignment System), which is a customized Shack-Hartmann wavefront camera from *Adaptive Optics Associates*, is installed and functional. The supplied LabVIEW code is currently being upgraded.

**Truss**
Although the truss adjustments completed, not all of the top nodes are within spec. This means that the prescribed absolute positions for segments are not met, so the inter-mirror gaps are not quite as specified. These are being considered as possible concessions in the final ATP.

**Performance**
The CTE variations, internal stress & optical quality is a factor of 2 better than spec, while deviations from the nominal radius of curvature is 50% better than spec. Typical surface accuracies on the mirrors are <17 nm r.m.s. (squash/30 at 550 nm ). The mirror actuators have a high degree of repeatability, without backlash or temperature effects. The CCAS alignment spec is 0.05" and results so far are better than this, even after about 20 mins following alignment, and is kept within spec for the rest of the night. However, the mirrors don’t yet meet piston spec. Global radius of curvature (GroC) can be measured to 10’s of microns, much better than spec.

Replying to question from Ken, Jian answered that half of the segment generated optical error budget is for CTE variations, and half for alignment (both ~0.38”). It should be possible to decrease the 1st and relax the 2nd. Darragh emphasized that global radius of curvature measurements look well within the range that can be calibrated and the project should emphasize this achievement, which Darragh felt to be an enormous reduction in risk. Jian replied, cautiously, that results to date validate control of GRoC over only one night, but that the spec requires meeting this for a week.
6 Acceptance Testing of SALT

David gave an overview of the acceptance testing procedures for SALT, which is included in his Project Scientist’s presentation and can be downloaded from the SSWG webpages:
www.salt.ac.za/content/science/restore/restricted_pages.htm
as a PowerPoint file “PS-SSWG-Oct03.ppt”.

The acceptance testing of SALT comprises tests done at subsubsystem, subsystem and system level. Subsubsystem level testing comprises individual component parts (e.g. truss, mirror mounts). For the acceptance testing of these, the relevant Project Manager is responsible and the Acceptance Test Plans (ATPs), which are reviewed internally.

For subsystems, which comprise complete units (e.g. mirror array with edge sensors, actuators), with interfaces to other subsystems and the Telescope Control System (TCS), the Project Manager and Systems Engineer are responsible. The test plans are reviewed by the Acceptance Test Committee (decided at last Board meeting), comprising individuals including Project Scientist & SALT Technical Operations Manager, who also review the testing procedures adopted, witness the tests and sign off on the results.

The acceptance testing hierarchy is therefore:

- component assembly & test (vendor and/or site)
- subsystem assembly & test (vendor and/or site)
- system assembly (site)

The testing is done against the specification, using a detailed verification cross reference matrix (VCRM). Each requirement in the specification is listed in the VCRM and its compliance ascertained by one of the following methods:

- analysis (usually an analytical approach involving theoretical or mathematical arguments)
- testing (actual experimental tests done, possibly using specialized instrumentation)
- inspection (visual inspection)
- review

Testing completed to date:
SALT facility ATP partially completed, but several major failures were reported including air conditioning (cooling capacity; now fixed) ventilation louvers (leaking when it rains; still requires attention from contractor). The ATP report has just been issued and will be reviewed soon.

SALT tracker Factory Acceptance Testing (FAT) has been concluded. This included: X & Y drives, hexapods, °-rotation, “anti-gravity” device and software. All but the last item passed their FATs. The software is now being addressed. An ATP report is still to be issued, and will be reviewed soon.

SALTICAM VI pre-ship acceptance testing was completed, which covered the mechanical performance, CCD control & parameters and control software. All but the latter passed, and these short-comings will be addressed in the subsequent testing. The ATP is still to be issued and then reviewed. Some concessions (e.g. software) were granted in order to get SALTICAM VI installed in time for on-sky tests.
System level testing
These are tests to check: telescope pointing accuracy, target acquisition (how efficient), tracking performance (open & closed loop), guidance and auto-focusing system (how sensitive, how efficient), optical image quality (as functions of field angle), telescope throughput, sensitivity to scattered light, etc (Gerhard passed around multiple page test matrix doc that was reviewed briefly by SSWG members).

Ken asked when FAT schedule would be released; Gerhard replied that it will be generated by the end of the year. It will include descriptions of the tests and when they will be done, released & reviewed.

7 Observing Protocols & Partner Interaction SALT (David Buckley, Roy Emerich)
The presentation covering this topic can be downloaded from the SSWG webpages: www.salt.ac.za/content/science/ restrict/restricted_pages.htm as a PowerPoint file “PIPT-Oct03.ppt”.

Based on email discussions it was decided there will be 3 proposal periods/year, spaced around e.g. NASA spacecraft and Gemini deadlines. The PI Planning Tools will include a Phase I submission form. Phase I & II deadlines were proposed to be ~1 month apart. Larry felt that the gap between Phase I & II should be as long as possible. There needs to be sufficient time to develop Phase II proposals, whereas less time is needed after the Phase II deadline for building a queue.

Brian asked whether the SALT Observatory staff will see Phase I proposals, or is it just the TACs? David answered that SALT Observatory will see them, partly for a low-level reality check on feasibility, etc. The forms will be of a standard format, allowing for the transfer of necessary fields to populate the Phase II form.

Email discussion also confirmed the SSWG desire to scrap idea of a multi-partner super-TAC, but like HET have a TAC Chairs Group to sort out conflicts, chaired by SALT Science Director. Larry: HET experience is that TAC Chairs do need to meet to sort out cases where there are only limited tracks available.

There will be 5 target priority classes: T1 & T2, which are time critical & ToO, S1, S2 & S3 queue, top 20% in T1 + S1 (no over-subscription), 40% in T2 + S2 (no over-subscription), 40% props in S3 (over subscribed by >2x). Ken: T1 is “I want particular track” or “asap” depending on science goal. The PI will specify the time constraints. T1 targets imply observations constrained in time to within hours, T2 within days. Latter might be, for example, predictable but still time critical events (e.g. where an ephemeris is available).

Larry stated that it was just like observing with a space telescope, but with seeing & clouds. He also mentioned that HET has a Priority 4 queue for targets that can be observed in very poor conditions, but not might be compelling 10-m class science. David answered that the S3 includes this category. Larry: but everyone is charged for setup time. P4 would not charge you for this. If you don’t do so, then no-one wants this time without incentives.

Larry also mentioned that HET experience is that during a trimester the TAC Chairs have monthly telecons in order to “twiddle” target or program priorities to address missing science or assist program completion. To date HET have not accounted between Bright & Dark time because of partner interests. So far image quality at HET hasn’t been an issue (i.e. bad vs. good seeing).
Ken: informal trades between partners, like at WIYN, won’t work.
Larry: HET now says that targets are high priority, but only in bright time. If 20% of projects that have high priority, this will ensure they get done. If these were at 30 or 40% priority 1, then they wouldn’t all get done.
David: popular parts of the sky, leading to potential over-subscription (e.g. Magellanic clouds), will hopefully be dealt with impartially by the unbiased scheduling tool, which aims for efficiency.

The concept of data proprietary periods was discussed. South Africa would like to support an African Virtual Observatory, ensuring timely publication of SALT data. Other partners will determine their own policies in this regard. Brian suggested that the proprietary period could be indicated on the Phase I proposal form.

Larry made the comment that many of these issues won’t be able to be grappled with until there’s a steady data-stream ~2 years from now.

Roy Emmerich (SALT TCS Software Engineer) then demonstrated the PI Planning Tool (PIPT), available for Windows & Linux.
In SALT Phase I, unlike for Gemini, selection of guide stars is not required, since there is no need to do this because of SALT’s relaxed image quality (compared, for example, to Gemini). Instead the guide stars are specified in the Phase II proposal using JskyCat, like Gemini, for target selection & overlays.

SALT will offer a pellicle setup mode where simultaneous observations with SALTICAM and another instrument (e.g. PFIS, FIF) will be possible. This pellicle will transmit >90% of the light to the science instrument, the remainder diverted to SALTICAM for guiding.

Ann asked if there was any allowance possible in the PIPT for addition information at a sub-partner level (e.g. for UK Consortium of 6 institutions)? Ways of doing this was discussed within the existing Web tool, which will be incorporated in future release. Incremental updates of software will be possible with the planning tool. Initial downloads will be followed by updates if, for example, new instrument modes are developed change. Gerald noted that this was the way to prevent obsolete or uncommissioned modes from being specified by PI’s. Larry mentioned that at HET the program status is updated automatically as the Resident Astronomer fills in the night logs.

8 SALT bandwidth & data distribution (David & James O’Connor)
The SAAO link to outside world is 8x more expensive monthly than between Cape Town & Sutherland. 1 Mbps guaranteed and up to 2 Mbps will be R1.5M per year, which is unaffordable. This cost, incidentally, was not factored into the original operations cost estimates done at the beginning of the project.

Currently the bandwidth is 128 kb/s from Cape Town to the outside world. Larry stated that worrying about this at the present time was may be 18 months premature. However, Ken replied that we need to know asap how much data from commissioning we can expect to get back to Wisconsin for the resident data analysts. Larry also felt that PI’s need to see the data in a couple of days, in the longer term, or they won’t look at it at all. But he still maintained that we are 18 months away from this being a real issue as network bandwidth is a moving target.

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Darragh suggested a motion that for next 2 yrs we can live with couriered data every week, Larry seconded. Ken said that the present link out of SA is probably fine for telemetry, but we would need to courier data for the commissioning phase.

The following motion was carried unanimously:
SSWG endorses a 2 Mb/s Sutherland to Cape Town link, and asks that SALT/SAAO explore costs of courier vs. upgrade of existing link to, e.g. 512 kbps, and add tracer software to see where the bottlenecks are.

James will continue to monitor the situation. During lunch, Gerald checked the US-side costs at www.fedex.com and found that a FedEx box big enough for a dozen DVD’s in cases (55 Gb uncompressed!) for a 2-day delivery from Cape Town to, e.g. UNC in North Carolina, costs $86 US. SOAR experiments show that JPEG 2000 lossless compression gives about factor of 2 compression.

9 PFIS Commissioning & Verification (Ken Nordsieck)
The presentation covering PFIS commissioning can be downloaded from the SSWG webpages: www.salt.ac.za/content/science/restrict/restricted_pages.htm as a PDF file “PFIS-comm-Oct03.pdf”.

Ken Nordsieck gave an overview of the PFIS commissioning and verification phase requirements. He needs enough people to look at the data for quick feedback. Ken stated that we need to state the total number & distribution of mirrors in the telescope required to commission PFIS. He asked if the SSWG were happy with verification observations being done using a subset of mirrors? He also mentioned that a fair number of calibrations depend on how filled the aperture is. These would have to be redone by the ops team once the primary is filled.

Kobus stated that all mirrors would be installed by May 05, and 80% of the pupil filled by Dec 04. David mentioned that Ken and the PFIS team would get SALT science operations support (e.g. personnel resources) and in addition any SSWG people who might wish to participate to support the commissioning.

Brian asked what type of resources would be required, to which Ken responded that people with shared risk programs were needed, e.g. post-docs with some instrument experience. Experience with more than just data analysis was required, as there would be a need for characterizing non-optimized instruments to ascertain whether or not the performance specification were being met, and if not, how to improve them.

There were no immediate responses/volunteers from the SSWG. Larry noted that once people saw the instruments and telescope on schedule in 6 months, then we would start to get offers. Ken predicts that the verification period will extend from Jan-May 2005, and the Fabry-Perot verification will take ~2 months of this time. He also stated that another way partner can support this phase is for them to propose commissioning science programs.

Brian mentioned that John Thorstensen (Dartmouth) is interested in participating in astrometric work, to map focal plane distortions which Ken was happy to hear. Pat asked when commissioning programs would be selected, to which Ken replied by the middle of next year and that he and David would selecting appropriate programs. Matt Bershady asked to what extent the unfilled mirror array was going to be a problem with scattered light during commissioning? Ken replied that various
instrument parameters need to be determined, like throughput, scattered light, image quality, polarimetric calibrations. There will still need to be a final calibration when all mirrors are in place.

Jian will send to Ken Kodak’s mirror delivery schedule. The final mirrors will be installed by the end of March ’05 (originally due end of Nov ’04), and will have a full aperture then, but not all will have edge sensors installed (~month later?). David stated that access will be possible to the exit pupil, without removing PFIS, so that it would be possible to change pupil aperture mask as mirrors are installed. Ken asked whether it would be possible to accept an extrapolation on instrument performance based on the results of tests conducted without the full mirror complement. David replied that we really have no choice.

10 SALT High Resolution Spectrograph PDR (Peter Cottrell & Michael Albrow)

David began with a summary of the HRS PDR report and the HRS team’s response to it. Next, Peter responded to David’s 20 question-summary of reviewer’s comments.

David asked what a “heat pipe” was, to which Darragh replied that it was a gizmo developed largely at JPL that transfers heat entirely by convection without conductive losses.

Peter asked when a final version on the fiber coupling report from R. Content would be received. David answered that Robert’s VLT instrumentation obligations were holding up completion, and that he hasn’t been paid yet.

David commented on general aspects of the PDR meeting for future reference. He felt that a 1 day meeting may be too short, since there is no time for off-line discussions and post-review brain-storming. Different issues also get raised by internal vs. external reviewers, which is fine, since different perspectives is what you want, as long as they’re backed up.

Next, Peter presented optical work done to date, which compares the original R2 design with an R4 design based on Delabre’s suggestion. The beam size for the R4 is now only 200mm, vs. a 365mm beam for the R2. Despite the smaller beam size, there is still a requirement to mosaic 2 echelle gratings (41.5 grooves/mm). The three VPH suppliers approached are comfortable with 200-250 mm sized optics. David stated that the order separation was not bad, Peter confirmed that for R2 it is about 20", while R4 is about 12".

Note: no heat pipe is required in R4, but with a 2 chip mosaic, you don’t recover the chip gap from other orders. However, there is full wavelength coverage out to a larger lambda with the R4. VPH cross-dispersers give broadly variable efficiency curve from high 70’s in blue peaking to 92% at 450 nm, and 60% at 600 nm vs a flat curve you get from prism cross dispersers.

R2 vs R4 efficiencies:
The VPH gratings produce a roll over in sensitivity from 550 to 650nm. Because of this, they are looking into using a grism (600 grooves/mm, so standard format) for red, but blue will certainly better with a VPH.

The camera designs for R4 are still rudimentary. Larry thought that for the blue camera QE’s, using the UVES values would give a good idea on performance. The
Red arm is worse because there are collimating mirrors and a dichroic, as well as the camera. Janucz asked whether there are worries about using BK7 upstream. Michael replied that there’s none in the camera optics, so “cosmic rays” get absorbed upstream. Matt Bershady asked if capturing orders in both the red & blue in transition region of the dichroic is possible to fill gaps in cases where you are not read noise limited? Michael replied that this was possible. Brian enquired what the costs were, to which Peter replied the full costs have not been estimated yet. Although there are the same number of CCDs (2+1 for R4 vs. 3 for R2), there now needs to be two dewars and Leach controllers. Anne stated you will need more calibrations with R4 because fringing in the cross-over region between red & blue makes calibrations unrepeateable.

Brian moved that the R4 design be sent to the PDR external reviewers for comment. All were in favor, with 1 abstention. Brian felt that management and cost issues need to be addressed, independent of whether the design is for R2 or R4, because the HRS team formally failed some of these areas. Larry suggested that a “delta PDR” telecon might be useful to resolve these issues. Michael replied that the reviewers comments were in fact not specific on these areas and HRS did not fail on these. Ken felt that we do need to have risk and cost estimates by December that we are happy with. David concluded that the HRS design is still progressing as a PDR phase. Brian stated that if the R2 design became the preferred design, its progress to a Critical Design Review would not be automatic and that SSWG would need to approve this after being satisfied that all the PDR shortcomings were addressed.

11 Report on Fiber Instrument Feed PDR (David Buckley)

David summarized the status of FIF. The design now supports only a single-object mode. Upgrading to multi-object in HRS would require an upgrade of FIF. Minimum separation between fibers will be about 12".

Brian asked whether there is a need to have FIF finished before 2006. David replied that he has already committed to have Nick Sessions (Project Engineer) work on FIF and has budgeted for this now. He also wanted to commission FIF, which is integrated into the payload subsystem, while project team was still there. Also, the ESTEC STJ-based camera (S-CAM5) may potentially come here before HRS, giving us another fiber-fed instrument.

Both David’s presentations on the HRS PDR and FIF are included in his Project Scientist PowerPoint presentation, which can be downloaded from the SSWG webpages: www.salt.ac.za/content/science/restrict/restricted_pages.htm as a PowerPoint file “PS-SSWG-Oct03.ppt”.

12 11 SALT Ops (James O’Connor & Patricia Whitelock)

James and Patricia summarized the proposed SALT operations planning. An optimizing phase would begin ~1.5 years out, lasting 2.5 years, and involving 21.7 Full Time Equivalent (FTE) positions. Steady state phase would then commence, lasting ~7.5 yrs, with 17.25 FTE positions. This plan has no provision for upgrades or 2nd generation instruments. Problems and tasks will be tracked with Microsoft task management “Great P(l)ains” software.

SALT & SAAO will be an integrated entity, aiming at the highest possible availability of the telescope. Darragh felt that allocating only Rand 2M was way too low to keep instrument spares (collimator lenses, pumps, filters). Note that only 1 CCD spare is
being purchased. Brian asked how many Rand are being spent before ops begin to which James replied Rand 12M, i.e. close on $2M. Jeff Percival asked whether SALT & SAAO personnel will be cross-trained to which James replied to the affirmative.

Matt Bershady stated that new telescopes age rapidly, with major systems failing in the early years. He asked how will replacements of specific hardware, such as hexapod legs, will be handled? Can HET offer some guidance? Larry answered that buying a spare hexapod leg was mandatory. Larry continued by saying that they have understaffed software engineering at HET. Mechanical engineers did the whole job in the past. Gemini did what we are proposing and their software engineering effort has grown.

James stated that SALT staffing would use as many existing SAAO staff as possible for operations, but that there would still be a need to recruit new people as well. Brian mentioned that originally the plan was to hire post-docs, but now all SAAO astronomers would be involved. Patricia answered that SAAO astronomers would not just be working on SALT, but would also be involved in other duties, like teaching throughout SA, for example. While they would need to show complete commitment to SALT, they should also not be shoved aside by younger. SAAO currently has 13 staff, 5 on temporary contracts (post-docs and post-retirement).

Ken felt that we wanted to go through a middle route, with committed existing staff, but also bring in others with experience at other large telescopes. David Lambert stated that some people are 100% happy to do just support, and it would be foolish to give them research time. 3 FTE’s is too low based on HET. Larry felt that this is almost an individual issue, but that people seem to grow toward support role, away from research. You need highly skilled people going up there more than every couple of months, decisions must be made every few minutes to operate the queue, expensive at 50 cents/sec. A science manager has to make decisions every day (depending on weather etc), yet also set top-level decisions for both SALT operators and astronomers.

Chris asked if the operators would be living in Sutherland permanently. Patricia replied that not all of them would be necessarily. Chris felt it worthwhile to search for mechanically inclined people in Sutherland village to fulfill these roles, and that we would find such people. Ken: who does do strategic science planning? David answered that SSWG will evolve into a group that advises science manager & Board on upgrades and new instruments. However, it would be up to the Board to figure out how to fund this.

13 PFIS update (Ken Nordsieck)

Ken’s presentation covering the PFIS status can be downloaded from the SSWG webpages:
www.salt.ac.za/content/science/restrict/restricted_pages.htm
as a PDF file “PFIS-Oct03.pdf”.

With >96% of the PFIS contracts awarded, use of budget reserve is at 77%. This means that cost uncertainties are less of a concern, and the remaining reserve will be assigned to real risk or contingencies (e.g. breakages, unplanned work, over expenditures arising from schedule slippages, etc.).

The overall schedule is a concern, although there is contingency for this. Janusz broke two NaCl blanks, and replacements have been just received. The asphere and
coating of the pickup element are the critical path items. Ken asked what filters for etalons are required? The current plan is for imaging only, not spectroscopy. But these would allow for more multi-slit spectra to be packed onto the detector without overlap. There are no plans for interference filters for imaging <430 nm (etalon limit), although people will want 3727. These issues will certainly arise at the SALT science workshop.

14 SALTICAM update (Darragh O'Donoghue)
Darragh's comprehensive status report on SALTICAM can be downloaded from the SSWG webpages:
www.salt.ac.za/content/science/restrict/restricted_pages.htm
as a PDF file “SALTICAM-Oct03.pdf”.

SALTICAM VI is back now at SAAO, and fixing a vacuum leak will start tomorrow.

15 HET Status (Larry Ramsey)
HET was shutdown for August and 3 weeks of September to allow a number of engineering tasks to be completed, including SAC mirror re-coatings. Livermore coating on 2 optics did not improve throughput. They were a painful group to work with.

HET has now delivered 0.88" images, after throwing away optics in the acquisition camera and now having an improved mount model. Images of over 1.2" are now seeing dominated. Larry stated that HET “appear to have cut down last poles holding up the problem tent”.

In December, MRS will be operating in a single-object mode. MOS mode will probably come in 6 months time.

Matt asked how easy was it to disassemble the HET SAC? Larry replied that the whole process takes 2 weeks, with an excruciating series of metrology measurements to reassemble.

Pat enquired about the HET edge sensors. Larry answered that they work but that the electronics boxes show some flakiness. They cannot hold good beyond a ±1°C temperature change. They will be insulating the truss to slow down time between SAMS stacks. The optical alignment with the CCAS Shack-Hartmann camera is now so fast compared to what it used to be, that they are happy now.

Larry concluded that no SALT people had applied for HET time yet.

16 SALT partner reports
The following was reported:

Wisconsin: Daniel Harbeck, a postdoc, will be working on PFIS commissioning of the MOS.
Rutgers: A new faculty member, Chuck Keeton, has been appointed.
UK Consortium: PhD students may be available to assist in reduction of commissioning observations. A mirror site for SALT data might be possible at one of the UK SALT institutions.